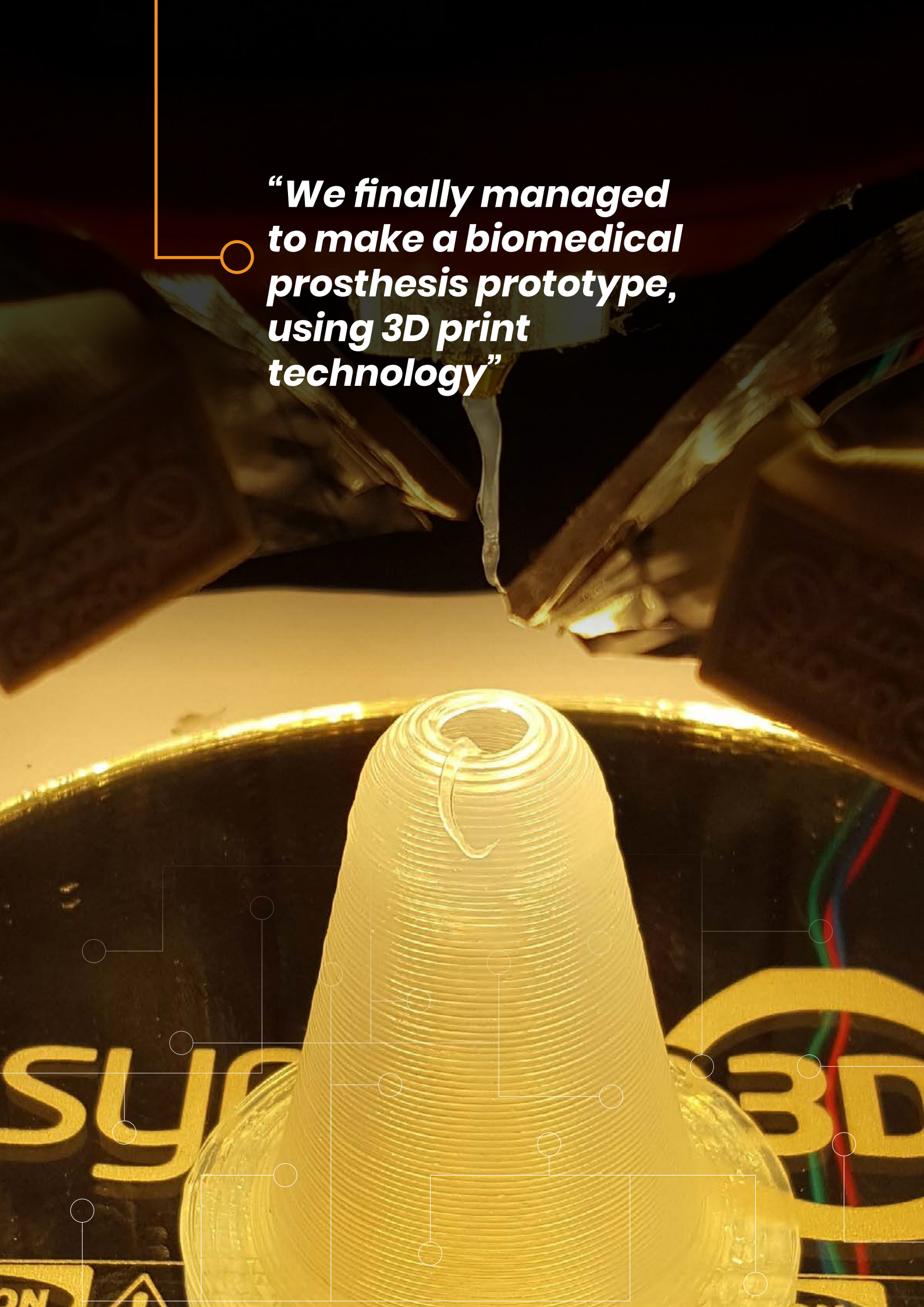


“We finally managed to make a biomedical prosthesis prototype, using 3D print technology”



MedIn

New functionalized medical devices for surgical interventions in the pelvic cavity

The incidence of cancer is growing all over the world and at the same time the number of surgical interventions in the field of oncological surgery records a continuous growth year after year. These surgical interventions, called pelvic exenteration or evisceration, are often associated with a high post-operative morbidity and mortality. In the Manunet project 'MedIn', the Norwegian-Romanian consortium formed by the partners RISE PFI AS (Norway), The National Institute for Research & Development in Chemistry and Petrochemistry (Romania), LTHD Corporation SRL (Romania), Oxy Solutions AS (Norway) and Universitatea de Medicina si Farmacie Bucuresti (Romania) has succeeded in developing a pelvic prosthesis aimed at preventing possible complications that may occur as a result of surgical interventions. Gary Chinga Carrasco, project leader of the consortium: "Our innovation project can be divided into two specific biomedical developments. First, we focused on the development of an innovative prosthesis that improves the quality of life of vulnerable patients with cancer in the pelvic cavity. Secondly, we have produced oxygenated nanocelluloses for wound dressings."

Development of innovative prosthesis

The pelvic prosthesis developed in the MedIn project is designed to fill the empty excavation, support the intestinal loops and prevent any inflammatory phenomena caused by the adherence of perineal tissue. “The development of the prosthesis as a medical device was the biggest technical challenge in our project,” states Chinga Carrasco. “We had to find a material that was easy to implant into the human body and that, moreover, did not cause any side effects. In addition, it was important to produce the prosthesis in such a way that the material could function in the human body for as long as possible. This is important, because you have to avoid having to re-implant the material. In order to achieve a successful prototype, it was necessary on the one hand to develop a good material concept for the prosthesis and on the other hand to find the right technology to actually produce the prosthesis. The material we ultimately used for the prosthesis was tested mechanically, in vitro and in vivo to verify its performance in relevant environments and also to ensure its bio-compatibility.”

3D printing as production technology

“Based on various tests in the innovation project, we concentrated on the development of a 3D printing technology. From a technological point of view, the biggest technical challenge in the end was the extrusion of the material in the 3D printer. The project partners therefore developed a

dedicated 3D printing extrusion and curing system especially to use with the material formulation developed within the innovation project. This has facilitated 3D printing of complex structures to be used as prostheses. Using an extrusion device and a curing device, we were able to ensure that the material could be deposited on a substrate during 3D printing on the one hand, and cured on the other hand. We are very pleased that we finally managed to make a biomedical prosthesis.”





Nanocellulose for wound dressing applications

“In addition to the prosthesis for the pelvic cavity, we have developed an innovative oxygenated wound dressing gel intended to protect the patient against surgical infections. This is very important because experience has shown that after oncological interventions, the occurrence of wound infections is highly probable. By using the wound dressing gel, many unpleasant complications can be prevented. For the production of the wound dressing we have produced tailor-made nanocelluloses that have been characterized considering structural and chemical details. In order to achieve a good product, we have performed relevant tests on nanocelluloses in combination with complementary components. These tests showed that the nanocelluloses developed in the project perform well with respect to other endpoints that are required for wound dressing materials including cytotoxicity, skin irritation and antimicrobial performance.”

Oxygenated nanocelluloses
wound dressing gel



Personalized prosthesis and tailor-made wound dressing

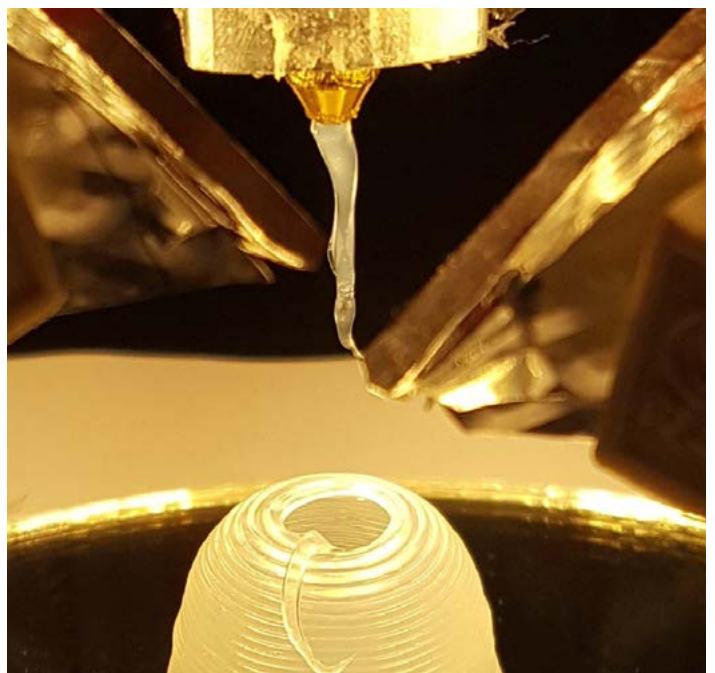
The advantages of the innovative pelvic prosthesis developed by the project consortium are obvious, states Chinga Carrasco. "At the moment there is no prosthesis that can be tailored to a specific person for this purpose. So the value we have added is that we are able to personalize the prosthesis. For example, a person is suffering from cancer in the pelvic cavity, most of the pelvic cavity has to be removed. We have now demonstrated that it is possible to produce a tailor-made prosthesis using 3D printing. I think it will be an advantage for society because it will improve the quality of life of patients after oncological interventions. In addition, the innovative oxygenated wound dressing, which is also designed to protect against chronic wounds, will also protect against surgical infections."

Commercialisation as the next step

"When it comes to cancer research and the development of biomedical devices, there is of course a large market. There is also clear market potential in the field of 3D printing of medical devices and wound dressings. As part of the project, our industrial partners (LTHD and Oxy Solutions) developed an exploitation plan and we now have a clear vision on how the results of the innovation project can be further commercialised. To speed up this process, we decided to submit a new proposal for a national project in Norway together with our Norwegian partner (Oxy Solutions AS), which was granted by the Research Council of Norway for the period 2020-2022. Within this project we will carry out preclinical and clinical studies to accelerate market launch of the product. However, because our innovation concerns a medical device, it takes a relatively long time to market the wound gel product."

Transnational exchange of knowledge

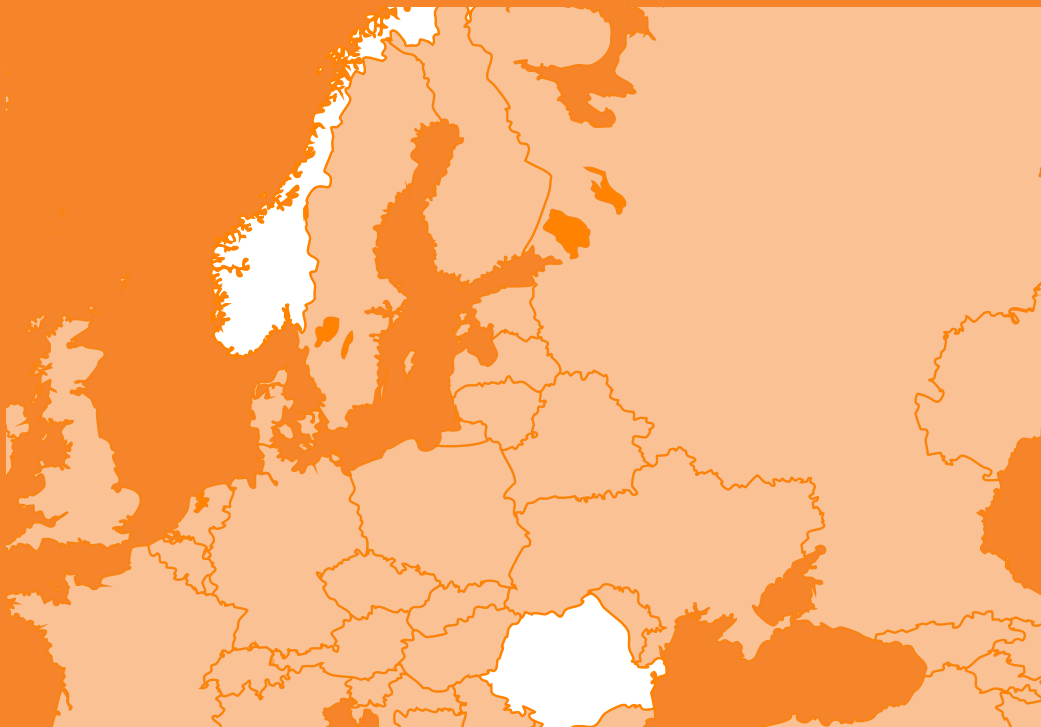
During the project there was intensive collaboration and a clear division of roles. "For example, in the project we worked in parallel with the development of the wound dressing and the prosthesis. The work was divided over five defined work packages. A major advantage was that all partners in the project have a great deal of experience in the development of biomedical devices. Most of the work around the development of the pelvic prosthesis took place with our Romanian partners, while in Norway we focused mainly on the realization of the wound dressing gel. It should be noted that during the innovation project a lot of knowledge exchange took place and the results of the various tests were discussed in meetings. We can look back on a successful cooperation in which the various project partners made optimum use of each other's expertise and skills. The collaboration has been very fruitful and we look forward to publishing the very interesting results we have achieved. We have now filed patent applications and are in the process of further disseminating the results obtained within Manunet."



Manunet as an accelerator for innovation

"The advantage of Manunet is that it is a 'non-bureaucratic programme'. It is a very effective instrument to realize innovations with impact relatively quickly. In addition, the added value for us was the possibility to work together with companies and research institutes on a transnational level with the aim of increasing our competencies and business network. As a result, we developed a new project in Norway and another initiative with Romanian partners. Manunet can be seen as an innovation accelerator where it is possible to make the step towards commercialisation. I am very satisfied with the project and in particular with the possibility to work together in an interdisciplinary way on the development of biomedical devices."

Chinga Carrasco



Acronym

MedIn

Call

Call 2017

Coordinating Funding Agency

RCN

Participating partners

RISE PFI AS (Norway)

The National Institute for Research & Development in
Chemistry and Petrochemistry (Romania)

LTHD Corporation SRL (Romania)

Oxy Solutions AS (Norway)

Universitatea de Medicina si Farmacie "Carol Davila" Bucuresti (Romania)

Project duration

24 months

Total project cost

€ 697.200



Contact

RISE PFI AS (Norway)

Gary Chinga Carrasco

(47)90836045

gary.chinga.carrasco@rise-pfi.no

<http://www.rise-pfi.no/>

“As Manunet lead partner I’m very pleased that we are able to boost the innovation potential in Europe”

Garbiñe Larrauri - Innobasque

